consequence being that the molecules cannot possibly fit together into a compact mass, as, for example, the rhombohedra of calcite do; for ice really resembles compact snow.

GEORGE HENSLOW

### Sunrise-Glows

ON the morning of the 7th inst. a curious form of sunrise-glow was observed on Ben Nevis. The sky at the time was covered by a uniform thin sheet of stratus-cloud lying just a little above the hill-tops all round. About 7 a.m., shortly after sunrise, the sun was shining downwards through this cloud, and the valleys to the eastward of Ben Nevis were filled with a "glow" exactly similar in colour and general appearance to the upper glow so often observed before sunrise and after sunset. The temperature at the time was very low—9°.2 F.—and at 7.16 a portion of a vertical halo passing through the sun's disk was seen. This "under-glow" would seem therefore to have been due to the presence in the air of ice-crystals, rather than of dust, whether cosmic or otherwise.

R. T. OMOND

Ben Nevis Observatory, March 8

### A Horrified Cat

LAST week, in connection with a study of Carnivora, I obtained a cat from an acquaintance at a distance, and carefully dissected it in a room above our stable. When I had finished, the cat was, as may be supposed, hardly to be recognised. I cleaned the scalpels, placed them in the case, and took them to the house. No sooner had I put them down than I observed our own cat go and sniff all around the case with a peculiar look of intense wonder. I took the instruments away, and thought no more about it; but a short time after I returned to the remains of the dissected cat in order to prepare the skeleton, when I saw our cat standing at a distance of about a foot from the dissection, and presenting an appearance of most helpless terror. She was trembling from head to foot, and in such a condition of evident horror that my presence had no effect upon her. After some moments she noticed me, and then darted away with a scared look such as I have never before seen. She did not return to the house that day—a thing quite unusual; but on the next day she returned and entered the house with a fearful caution, as though realising the probability that she herself might become a victim to science, and her whole conduct has changed.

This suggests that the country custom of using dead birds, weasels, &c., as a scare to the like is not entirely unreasonable, and it would be interesting to know whether others have noticed similar effects.

E. J. DUNGATE

Horton Kirby, Dartford, March 23

### Nocturnal Hymenopteræ of the Genus *Bombus*

AS no one has replied to Mr. Doria's letter in NATURE for February 25 (p. 392), I may say, in response to his inquiry, that I have heard in England a number of bees on a species of Tilia, at dusk, when it was probably much darker than the "very bright moonlight" referred to by Mr. Doria. It was too dark to watch them, but their "hum" was very audible, and on my dragging down a bough of the tree I saw one bee fly away. In Herman Müller's "Fertilisation of Flowers," English translation, p. 67, it is stated that a social wasp (*Apoica pallida*) in Brazil seeks honey "*only by night*," sitting still in its nest by day.

Query. Might not the "very bright moonlight," and not habit, be the cause of the bees appearing at night, as described by Mr. Doria? I should hardly think a bee could discern between moonlight and twilight. I have several times seen bees rapidly on the wing, and apparently making for home *in the twilight*.

JNO. C. WILSON

Fairfield, near Manchester, March 13

## *A LINGUISTIC REVOLUTION*[1]

JAPAN, in modern days, is the land of revolution and of change. The systems and habits of centuries are rapidly disappearing; the old order is being dissolved by contact with the West, and every year produces some reform which brings the country more and more into line with Europe and America. There may sometimes be haste, but there is no rest, in Japanese movements; there is little swerving to the right or left, and now for about sixteen years the country has been, on the whole, steadily moving along towards one goal, viz. equality with Western nations, politically, socially, and intellectually. But of all the wonderful changes which the present generation has witnessed in that country, perhaps not one has been so strange or widely beneficial as that the commencement of which is described in the pamphlet before us. And as the first who will profit by it, should it prove ultimately successful, will be the rising generation which has to study Western science in all its branches, it deserves special description in these columns.

It will be known to many of our readers that the Japanese language, which, in its genius and structure, is wholly different from that of China, is nevertheless written by means of the Chinese ideographic or pictorial signs, aided by two alphabets or syllabaries, themselves based on Chinese characters. The object of the new movement, shortly stated, is to sweep away these signs altogether, so far as Japan is concerned, and to use Roman letters only in writing the language. The Association, which has been formed to carry out, as far as a private body can, this reform, has issued the present pamphlet by the advice of Her Majesty's Minister in Tokio, with the view of making known abroad a movement "which its authors believe to be an important step in the intellectual progress of their country." We cannot do better than follow this official statement of the evils of the present system, which is an incubus on the intellect of the nation, and which adds incalculably to the mental toil, more especially of its scientific youth, at the most important stage of their lives. It may be well, however, to say at the outset that the reform is no mere craze of a few misguided enthusiasts. The Society numbers amongst its most active and sympathetic members not only Japanese scholars of eminence who have studied their own as well as Western languages, but also Europeans and Americans who have devoted their lives to the study of the Japanese language and literature, and Western diplomatists who are most unlikely to participate in any visionary movement of a large nature. When men drawn from these various classes The with the best means of studying the question on the spot join together with the object of carrying the reform in practice, we, who have not the same opportunities of becoming acquainted with the local circumstances, may be excused from discussing its practicability any further. We may take that for granted, or we should not find the names supporting the reform that we do. Another point to be noticed is, that hitherto the Government has officially held aloof from the Association, preferring, no doubt, to allow private effort to prepare the soil beforehand. To return, however, to the pamphlet issued by the Society.

The object of the Romajie Kai, it states in the first sentence, is to introduce the use of Roman letters, instead of Chinese ideographs, for writing the Japanese language; when a language can be adequately represented to the eye by twenty-two signs indicating sounds, why (it asks) waste time and effort by continuing to represent it by many thousands of symbols pictorially representing objects and ideas? It is a labour of years to learn to write the Japanese language as at present written, viz. with Chinese characters supplemented by syllabaries invented by Japanese scholars a thousand years ago. The number of Chinese characters is not their only disadvantage. Upon their introduction (we here employ for the most part the exact words of the pamphlet) into Japan, it was early found impossible to restrict the employment of them to the expression of purely Japanese words of corresponding signification. The Chinese sounds, or, rather, a more or less inaccurate approximation to the Chinese

[1] "A Short Statement of the Aim and Method of the *Romajie Kai*" (Roman Alphabet Association of Japan). (Tokio, 1885.)

sounds, was imported gradually into the language of Japan along with the written symbols. It has therefore come to pass that, in Japanese books, one and the same character is at times used as the equivalent of a Japanese word, and at other times of the synonymous Chinese word. But, besides this source of confusion when the characters are used with their proper ideographic values, there is a further element of doubt and difficulty imported into written Japanese by the circumstance that many of the characters are occasionally employed as merely phonetic signs, irrespective of their meaning; sometimes to represent the mere sound of a Japanese word, at other times the mere sound of a Chinese word. Thus the difficulty of the ideographs arising from their numerical superabundance is aggravated by ambiguities in the modes of using them. Another disadvantage of the Chinese characters is the complexity of their form and structure. Although some scores of them are written with no more than three or four strokes of the pen each, there are thousands of others requiring each as many as ten, twenty, thirty, and sometimes even more than forty distinct movements of the hand for their formation. To write these complex combinations of lines, curves, and points always at full length was a task too much even for Chinese patience, and at least two distinct varieties of abbreviated handwriting came into general use both in China and Japan, namely, the "cursive" and the "grass" script. In most cases, however, these contracted forms of the characters are so destitute of any likeness to the original forms as to afford no aid whatever to the eye or to the mind in detecting their identity. To acquire the quicker modes of writing involves, therefore, a further considerable expenditure of time, and fresh demands upon the already over-burdened memory.

Nothing can be added to this clear and succinct account of the difficulties which lie at the threshold of knowledge in the Japanese language; but there is a serious aggravation of these difficulties, not referred to in the statement, when we come to the Western sciences, with the large and special vocabularies attached to most of them. If we take chemistry, for example, the Japanese student of this science is compelled to learn the binnslations into his own language of technical chemical staems and the Chinese characters which have been tinvented or adapted to represent these translations. Under the rational system proposed by the Society there is no reason why oxygen should not be written "oxygen" at once in Japanese, instead of by a couple or three fanciful symbols which may either be an attempt at translation or description, or an attempt to reproduce the sound, or arbitrarily selected to represent the word. The Japanese student would begin his work much where the English student does; he would learn the word "oxygen" once for all, and then learn its properties, combinations, &c., in the Japanese tongue, as the latter does in the English tongue.

The writers of the pamphlet then observe, with much force, that the excessive expenditure of mental power in learning by heart thousands of intricate symbols of sounds and ideas must diminish the stock available for use in other directions. The memory indeed is exercised, but at the expense of some of the other intellectual faculties. To this they are inclined to attribute in a large measure the comparative backwardness of the Chinese mind, and its deficiency in the powers of abstraction and generalisation—a very interesting observation which it would lead us too far to discuss now. Japan partially emancipated herself from the thraldom of the Chinese script when the syllabaries were invented a thousand years ago; but no complete deliverance is possible, they think, otherwise than by wholly discarding it in favour of a purely alphabetic system. So long as the literature of China formed the sole staple of education in Japan, little inconvenience arose from the multiplicity and intricacy of the Chinese ideographs, but now that European science is being eagerly studied and assimilated by the rising generation, the need of a simpler and easier script for the expression and propagation of the new ideas becomes every day more evident. The most convenient course is, clearly, to adopt the new terms as well as the new ideas bodily into the language, and this cannot properly be done unless the writing used be alphabetical. Amongst the subsidiary advantages of employing the alphabet in which the languages of the leading nations of the world are written is that the acquirement of any other European language will be much facilitated. Europeans, too, will find it much easier to learn the Japanese language when the principal stumbling-block is thus removed, so that, as the writers properly conclude, from both ends at once the channel of communication between Japan and the Western world will be widened and deepened by the employment in common of the Roman alphabet.

Very few words will suffice to explain the broad features of the scheme of transliteration produced after much consideration by a Committee of the Society, and now universally adopted. First, in using the Roman alphabet the consonants have been taken at their usual English values and the vowels at their values in Italian; secondly, the actual pronunciation of the words regardless of their spelling in the syllabaries, the latter in many cases being so totally different from the pronunciation that even Japanese themselves are frequently at a loss to write words in the syllabaries; and, thirdly, the standard of pronunciation chosen is that of educated people in the capital at the present day. Of the twenty-six letters of the Roman alphabet, four, viz. *l*, *q*, *v*, and *x*, are not used in writing Japanese, and are therefore omitted; in regard to capitals and punctuation the ordinary English method is followed. Nineteen rules, most of them too technical for special mention here, are laid down: they are all simple enough to those acquainted with the syllabaries, and can be readily applied in practice. Finally, the pamphlet gives examples of the various styles—literary, epistolary, &c.—in the present mode of writing, and under the Roman system according to the rules laid down.

Such being the objects to be attained and the method of attaining them, it is satisfactory to observe that almost universal assent has been given to the work of the Society. Some of the principal journals of the country set apart a certain portion of their space for articles printed in the Roman letters; a journal wholly printed in this way is published by the Society itself; the number of members is increasing by leaps and bounds, and many of the most learned and influential men in the country have already joined the ranks of the reformers. On the other side, of course, there are the rooted habits of a thousand years; but the Japanese have already succeeded in changing so many of their old habits and modes of thought that they may be trusted ultimately to succeed in this reform also. Moreover, it should not be forgotten that the present method of writing Japanese by means of Chinese ideographs is itself and imputation, a graft on Japanese civilisation, and, it may properly be urged, that what the nation has done once it may do again. The letters of the future may not be so artistic and beautiful as those of the present day; but this æsthetic objection will be counterbalanced by the fact that several years, at the most sensitive and valuable portion of life, will be added to the work of each generation, and a crushing obstacle will be removed from the gateways of knowledge for the Japanese youth of the future. Those who have technical and local knowledge speak of the perfect feasibility of the reform, and the outer world may accept their verdict with reasonable confidence; we may all, with a clear conscience, wish Japan success in one of the most arduous and beneficent reformations ever undertaken for a nation.

Since the above has been in type we have received the report of the annual general meeting of the Society, held in the great hall of the Engineering College of Tokio on January 23, amongst those present being some of the most prominent members of the Japanese Government, and many representatives of foreign Powers in Japan. The annual report stated that the Society now numbers over 6000 members, scattered over the various provinces of the Empire. A proposition having for its aim the retention of the old syllabary system of spelling, was rejected by a large majority in favour of phonetic simplicity, as above described. The Minister for Foreign Affairs, Count Inoue, delivered a speech, in which, viewing the aims, methods, and probable future of the Society from a great variety of standpoints, he expressed his complete sympathy with the movement. The British Envoy, in describing the objects of the Association, said:—"We aim at nothing less than one of the greatest changes ever yet made in the history of literature, or indeed, I may say, of the world. We hope to bring the thoughts of a nation of 37,000,000 into closer communion and intercourse with the thoughts of the rest of the world, and by freeing memory from the task of learning many thousands of characters, the sense of which can be satisfactorily rendered by a couple of dozen letters, to give the intellect some leisure to acquire the many and varied branches of learning which the necessities of modern civilisation render so important to us all."

## *THE SURVEY OF INDIA*[1]

### II.

IN our first notice we reviewed the principal topographical and cadastral operations. We have now to review the interesting information regarding the physiography of the localities of operation and other subjects which is scattered over the Report, but chiefly in the appendixes.

The Andaman Islands were being brought under survey for the first time; they form a portion of the belt of islands extending from the south-west point of the Burman mainland to the north-west point of the great Island of Sumatra, which are all that is now left of what was probably once a long, tapering off-shoot from the Asiatic continent, such as we still have in the Malayan Peninsula. These islands became of interest to the Government of India only of late years, when a convict settlement was established at Port Blair, on the South Andaman Island; but as yet little intercourse has been established with the inhabitants, who are wild and barbarous aboriginal Negritos with very dark skins and of very small stature. They are said to consist of nine distinct tribes known as Akas, which occupy separate islands and speak different dialects. Our influence has been most operative on the Aka-Bojigngiji, who are settled nearest Port Blair, and our relations with some of the other tribes are said to be on a fairly friendly footing, but very little is known about them, and nothing of the interior of the islands which they inhabit.

The Aka-Járawas, who occupy the Little Andaman, have ever been openly hostile; they are professional wreckers whom it has been necessary to punish on more than one occasion for barbarities perpetrated on shipwrecked crews, but they still retain their reputation for treachery and cruelty, and hold aloof from friendly intercourse; of late years they have been visited annually by the Chief Commissioner, and presents have been made to them with a view to bringing about more amicable relations, but they have been known to accept the proffered presents and then attack the bearers on their way back to their boats; their language is said to be unintelligible to the anglicised or tamed Andamanese, who are employed as a go-between. The Survey officers landed on the island and deposited presents on the beach, and then retired to their boats; the Járawas advanced and appropriated the presents somewhat sulkily and retired into their forests, and consequently nothing could be done with them; but their dwelling-places were entered and examined by the surveyors in their absence. These were found to be substantial, well-built huts, affording shelter for from 30 to 40 people, circular, dome-shaped, about 60 feet in diameter, and rising to a height of some 35 feet in the centre; the dome was thatched, and supported on long poles set up in three concentric circles within the hut. Small cots and a rocking-cradle were found inside; and all round the interior pigs' skulls, beautifully cleaned and neatly bound up, were closely arranged about three feet from the ground.

Barren Island (lat. 12° 15′ by long. 93° 50′) and the Island of Narcondam (13° 26′ by 94° 16′) were visited and surveyed by Capt. Hobday, whose exquisitely shaded maps of these interesting volcanic islands are published with his report. Barren Island is circular in shape with a diameter of 2 miles and an area of 3·07 square miles. Its principal features are a main crater and an inner cone. The main crater is elliptical in shape, with axes of 1½ and 1 mile, the walls rising to a height of 1158 feet above the sea-level on the south-east, and sinking down to the sea on the north-west; the cone is about half a mile in diameter at its base, and rises 1015 feet above the sea, terminating in a small elliptical crater, with axes of 300 and 190 feet and a maximum depth of 74 feet. Steam and smoke were issuing from the highest point of the cone; sulphur was found in large quantities near the vent, at a temperature sufficiently high to be felt through the boots. There was evidence of three distinct outbursts of lava on the sides of the cone, half-way up; the slopes were coated with fine volcanic ash, which made the ascent very laborious; loose cinders and scoriæ of various sizes lay heaped together in confused masses around the base, amid which occasional tongues of alluvial soil, overgrown with thick grass, were found jutting from the inner slopes of the main crater; the outer slopes were covered with thick vegetation, the principal tree being a species of fig. The island was infested with rats, which had not yet learnt to become shy of man, and were readily knocked over with sticks; bats and large crabs were found on the summit of the main crater. The outer slopes of the main crater would, if prolonged, meet in a point immediately above the present apex of the cone; thus it is conjectured that the crater was originally a true cone rising to about twice its present height, and that the upper portion has been carried away by a violent eruption, such as recently occurred at Krakatáo, leaving the present truncated crater. The volcano is known to have been in an active state towards the end of the last century; since then it has been gradually cooling, and the temperature of a hot spring on the beach was found to be considerably less than it had been when measured by previous visitors.

The Island of Narcondam is about 2½ miles in length by 1¼ in breadth, and rises to a height of 2330 feet above the sea; it is composed of trachytic lava, but no trace of any crater was discerned. The slopes were covered with dense forest, but water was not found anywhere; flocks of hornbills or toucans, uttering a peculiarly shrill note, followed the surveyors on their way to and from the summit; and a large iguana, with long prehensile claws, was captured and sent to the Museum at Calcutta.

In Assam a raid of the semi-savage Akas who inhabit the hills on the borders of Tezpur and Lakhimpur, led to the acquisition of some new geography by Colonel Woodthorpe and a party of surveyors who accompanied the troops which were sent to recover the British subjects who had been captured by the Akas and carried away into their hills. The country of the Daphlas was crossed, when a river, never before heard of, the Kaneng, was discovered

[1] "General Report on the Operations of the Survey of India Department, administered under the Government of India during 1883-84." Prepared under the direction of Col. G. C. De Pree, S.C., Surveyor-General of India. Continued from p. 444.